

INDIANA STATE DEPARTMENT OF HEALTH
Fireworks-Related Injuries
December 2006 – July 2007

Through the passage of House Enrolled Act 1131, the Indiana State Department of Health (ISDH) received injury reports resulting from fireworks and/or pyrotechnics during 2003 and 2004. However, no reporting occurred in 2005 due to the expiration of this law. With the passage of Public Law 187 in 2006, reporting of fireworks-related injuries was reinstated with the reporting requirements being identical to those in the previous statute. This report presents fireworks injuries data compiled from December 31, 2006 - July 28, 2007. It describes the types of injuries and provides age-specific information for 2007 with a comparison of data to 2003, 2004, and 2006.

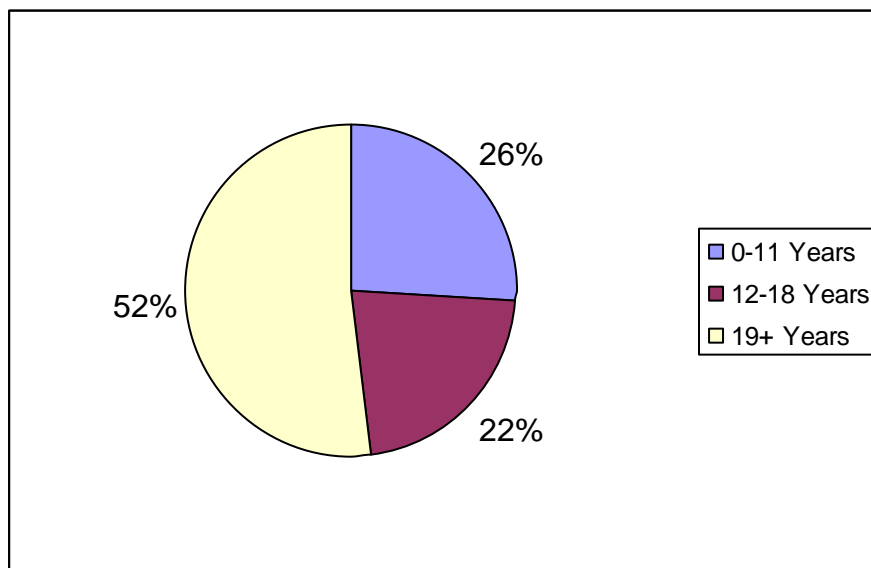
Highlights for 2007

- As of August 1, 2007, 156 unduplicated cases of fireworks-related injuries were reported to ISDH.
- Forty-eight percent of all reported fireworks-related injuries involved children and adolescents, who represent 26% of Indiana's population (US Census Bureau, 2005).
- Sixty-nine percent of firework-related injuries were burns, with the hand or fingers being the most affected body part.
- One out of every five (38 of the 194 injuries) reported injuries involved the eyes, with 92 percent (35 of 38) of those with eye injuries not using any method of eye protection.
- Four percent (6 cases) of injured persons required hospital admission for burns.
- Eight percent (13 cases) of injured persons were admitted to or transferred to a hospital with 4 percent receiving specialized care for burn or eye injuries.
- Sparklers, aerial devices, and rockets were associated with 54 percent (87 of 161 firework types cited) of all reported injuries.
- Mishandling and malfunction of fireworks accounted for 52 percent (85 of the 165 reported problems) of all those injured.
- Fireworks use on private property accounted for 83 percent of reported injuries.

Demographics

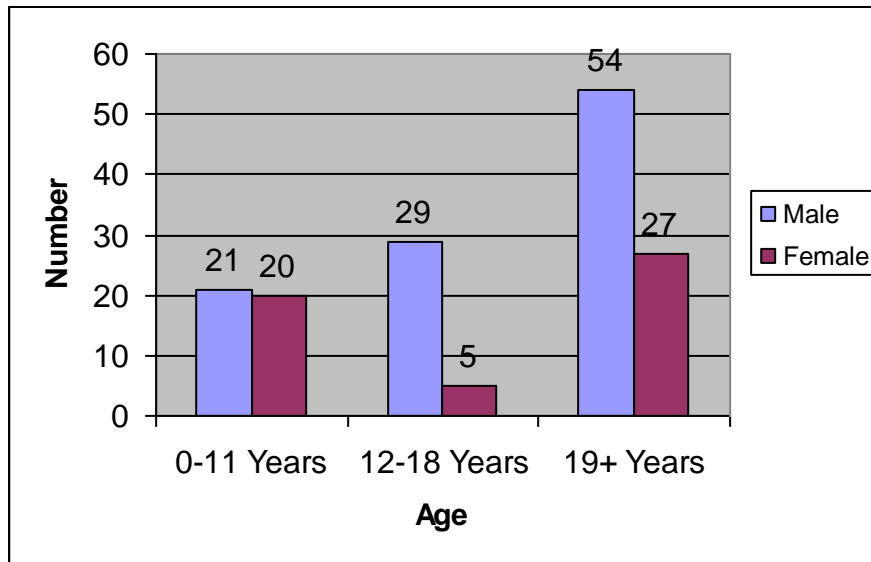
- The median age of firework-related injury was 20 years. The average age of all injured persons was 23 years with an age range from 2 months to 70 years.
- Forty-eight percent (75 cases) of those injured were 18 or younger (Figure 1).
- Sixty-seven percent (104 cases) of reported injuries involved males and 33 percent (52 cases) involved females. Across all age groups, males reported more fireworks-related injuries than females (Figure 2).
- Eighty-seven percent (136 cases) of injuries occurred among Whites, and Blacks/African Americans accounted for 6.5 percent (10 cases) of all injuries (Figure 3).

Figure 1: Firework-related Injuries by Age Category, Indiana, 2007



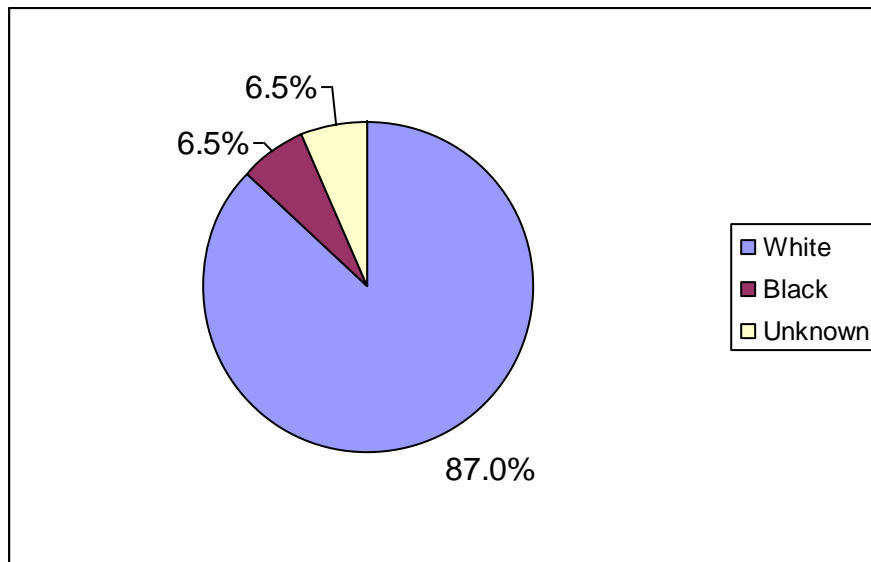
Source: Indiana State Department of Health, Injury Prevention Program

Figure 2: Fireworks-related Injuries by Age and Gender, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

Figure 3: Firework-related Injuries by Race, Indiana, 2007

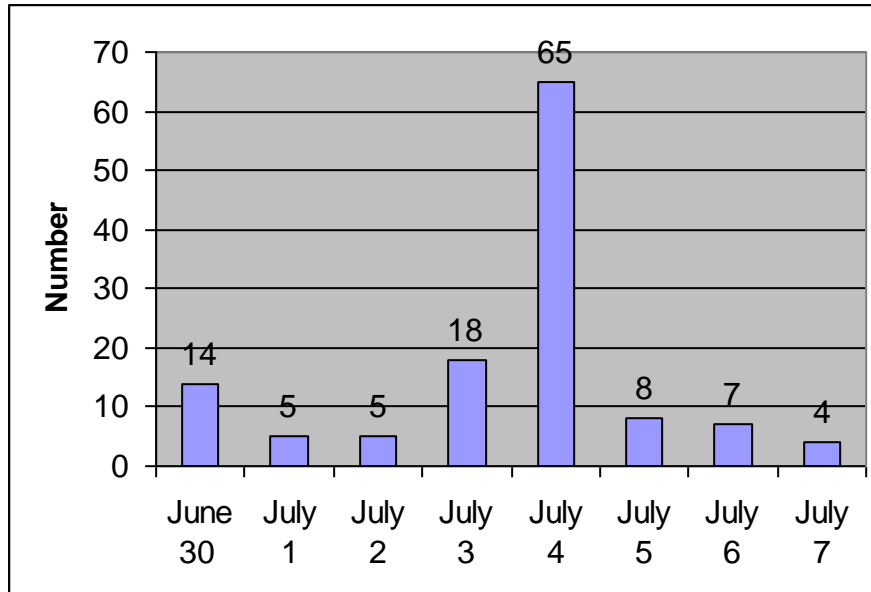


Source: Indiana State Department of Health, Injury Prevention Program

Date and Time of Injuries

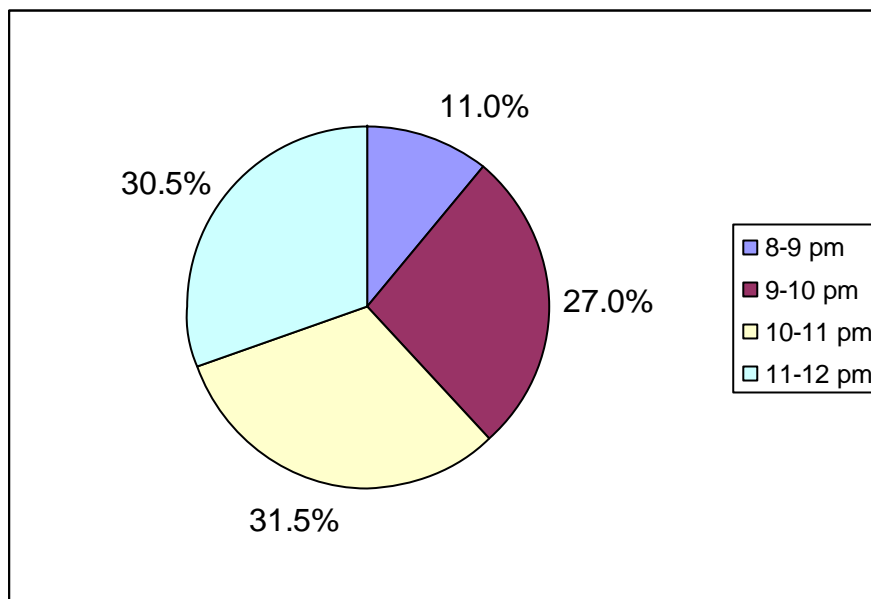
- Eighty-two percent (126 cases) of all reported injuries occurred between June 30 and July 7, 2007 (Figure 4). Forty-two percent (65 cases) of all injuries occurred on July 4, 2007.
- Sixty-one percent (95 cases) of all injuries occurred between 8pm and midnight with the majority (31.5%) between 10-11pm (Figure 5).

Figure 4: Firework-related Injuries by Date, June 30 – July 7, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

Figure 5: Four Most Frequent Times when Firework Injuries Occurred, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

Type of Fireworks Involved in Injuries

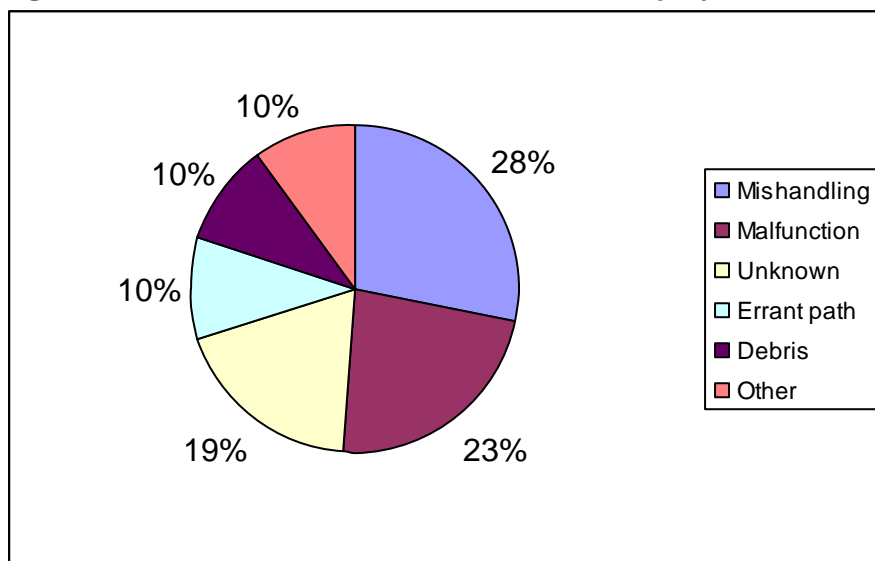
- There were 161 types of fireworks reported, injuring the 156 individuals.
- Sparklers, aerial devices, and rockets accounted for 54 percent of injuries (Table 1). Many other types of fireworks causing injury were reported, including mortars, smoke bombs, spinners, missiles, roman candles, and fountains.
- Although 28 percent (47 of 165) of reported problems that led to injuries resulted from mishandling fireworks, 33 percent (55 of 165 reported problems) were caused by firework malfunction or an errant path of a rocket (Figure 6).

Table 1: Frequency and Percent of Firework Type Involved in Injury, Indiana, 2007

Type of Fireworks	Frequency	Percent
Sparklers	30	19%
Aerial Devices	29	18%
Rockets (i.e., bottle rockets)	28	17%
Firecrackers	23	14%
Other (Roman Candles, Fountains, etc.)	18	11%
Homemade, altered devices	3	2%
Twister / "Jumping Jacks"	1	1%
Unspecified / Unknown / Other-Not specified	29	18%
Total	161	100%

Source: Indiana State Department of Health, Injury Prevention Program

Figure 6: Problem/Cause of Firework-related Injury, Indiana, 2007

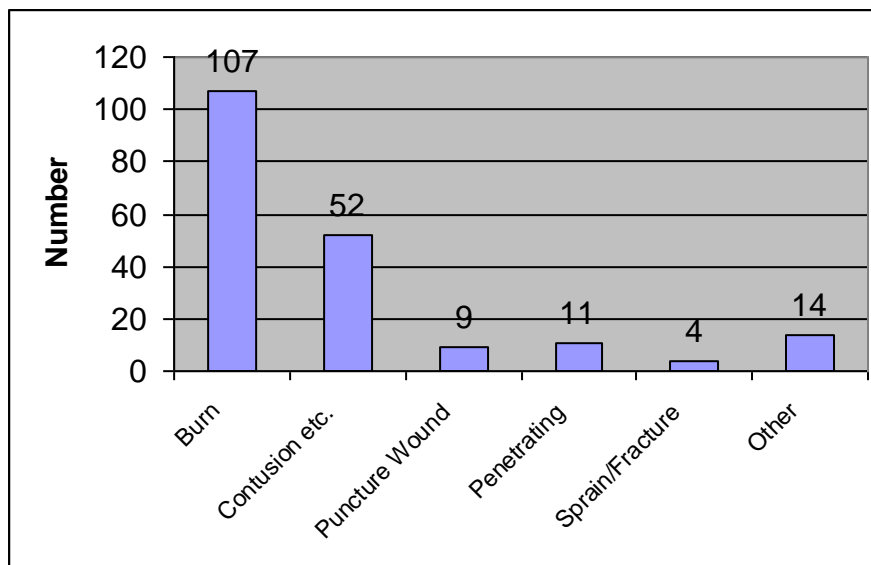


Source: Indiana State Department of Health, Injury Prevention Program

Type of Injuries

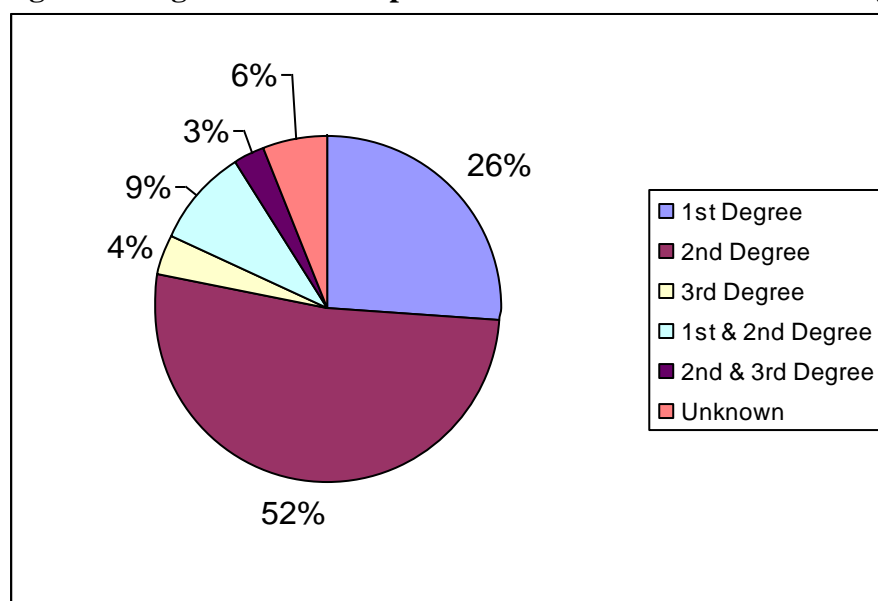
- The 156 cases sustained 197 types of injuries, with several individuals reporting multiple injuries.
- One hundred and seven cases experienced burn injuries (Figure 7). Of these, 52 percent (56 cases) reported second-degree burns and 26 percent (28 cases) had first-degree burns. Four cases reported third-degree burns. Twelve percent had more than one type of burn (Figure 8).
- Other types of injuries included contusions/lacerations/abrasions (52 cases), penetrating foreign body/missiles (11 cases), puncture wounds (9 cases), and sprains/fractures (4 cases) (Figure 7).

Figure 7: Type of Firework-related Injury, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

Figure 8: Degree of Burn Experienced from Firework-related Injury, Indiana, 2007

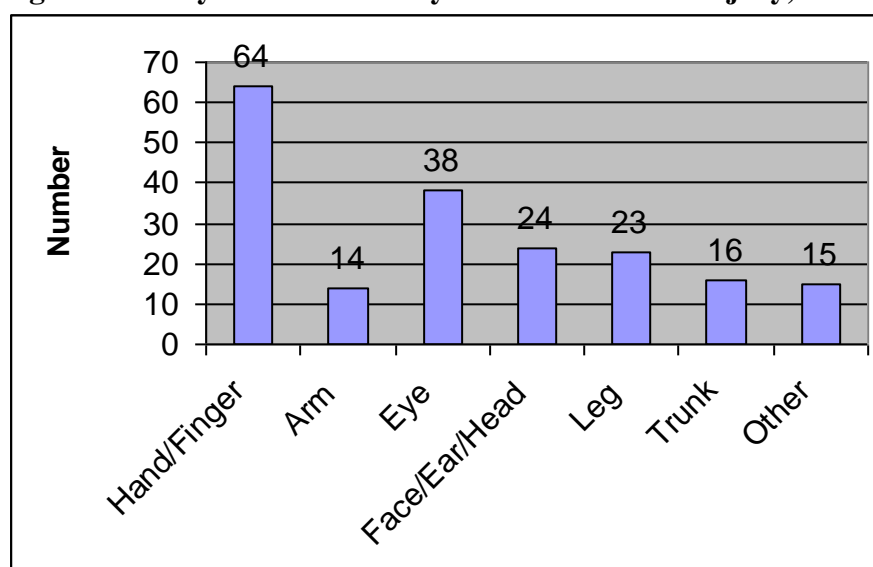


Source: Indiana State Department of Health, Injury Prevention Program

Body Part Injured

- There were 194 body parts injured, with many individuals having multiple injuries.
- Fifty-three percent (102 cases) of all injuries involved the hands or eyes (Figure 9). Injuries to the face, ears, and head accounted for 12 percent (24 cases) and injuries to the leg accounted for 12 percent (23 cases).
- Of those who had eye injuries, only 8 percent (3 cases) had some sort of protection (glasses or safety glasses).

Figure 9: Body Part Affected by Firework-related Injury, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

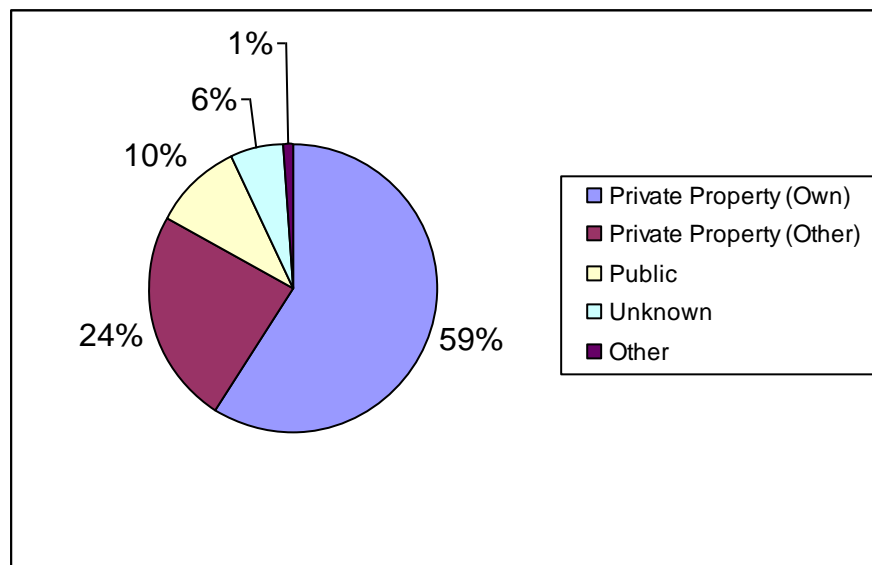
Source of Care and Outcome of Injury

- The majority (83%) of people injured by fireworks sought care at an emergency department.
- Ninety-two percent were released to go home. However, 8 percent were admitted to the hospital or transferred to another hospital. Four percent (6 cases) received specialized care for burn and eye injuries. There were two cases that underwent an amputation.
- There were no deaths related to firework injuries.

Other Information

- Fifty-nine percent (92 cases) of injuries occurred at the injured person's private home, yard, or property. A friend/neighbor/relatives' home or property was involved in 24 percent (37 cases) of injuries; public property was noted for 10 percent (16 cases) (Figure 12).
- Eighty-four percent of all reports did not provide information on alcohol consumption. Sixteen percent (25 cases) stated alcohol was related to the injury, and 17 of these cases reported alcohol use within three hours of the injury. Fourteen cases reported alcohol use by other people at the scene.
- Twenty-one percent (32 cases) of all people injured were bystanders.
- Among those injured who were less than 18 years of age, 61 percent (46 out of 75 cases) of injuries happened while in the presence of an adult.

Figure 12: Locale of Firework-related Injury, Indiana, 2007



Source: Indiana State Department of Health, Injury Prevention Program

Firework-related Injury Year Comparisons (2003, 2004, 2006, and 2007)

The median age for firework injuries was 18 in 2003 and 2004. In 2006, the median age decreased slightly to 17. Then, in 2007, the median age increased to 20. However, the increase was not significant ($p=0.052$).

For all four years, burns were the most frequently reported fireworks-related injury, accounting for over 60 percent of all injuries (Table 2). Although burns decreased from 73 percent in 2006 to 69 percent in 2007, the decrease was not significant ($p=0.16$). After hand injuries, eyes were the second most reported area of the body harmed by fireworks. The proportion of reported eye injuries increased significantly from 17 percent in 2003 to 25 percent in 2004 ($p=0.01$); however from 2004 to 2006 the slight increase to 29% was not statistically significant ($p=0.53$). From 2006 to 2007 the decrease to 25% was not statistically significant ($p=0.19$) either.

The proportion of people with fireworks-related injuries admitted to the hospital increased in 2006 in comparison to 2003 and 2004 but then decreased in 2007. The increase from 5 percent in 2004 to 11 percent (28 people) in 2006 was significant ($p<0.05$), but the decrease to 8% (13 cases) in 2007 was not significant ($p=0.22$).

Across all four years, the types of fireworks causing most injuries (sparklers, rockets, and firecrackers) and the reason for injury (mishandling, errant path, and malfunctioning) did not change significantly ($p>0.05$).

Table 2 Comparison of Firework-related Injuries, Indiana, 2003, 2004, 2006, and 2007

Category	2003 ⁽ⁿ⁼²⁶¹⁾	2004 ⁽ⁿ⁼²³³⁾	2006 ⁽ⁿ⁼²⁵¹⁾	2007 ⁽ⁿ⁼¹⁵⁶⁾
Demographics				
Median Age/Range	18 (0-74 yrs)	18 (0-72 yrs)	17 (0-67 yrs)	20 (0-70)
Children/Adolescents	53%	52%	55%	48%
Males	73%	76%	70%	67%
Females	27%	24%	30%	33%
White	84%	87%	82%	87%
Black or African American	10%	8%	13%	7%
Injury Type				
Burns	76%	67%	73%	69%
Body Part Injured				
Hand	34%	32%	36%	41%
Eye	17%	25%	29%	24%
Injury Circumstances				
Injured on Private Property	83%	89%	86%	83%
Cases with No Eye Protection	82%	88%	97%	92%
Children Injured with Adults Present	60%	50%	64%	61%
Received Specialized Care for Burn or Eye	8%	19%	12%	4%
Injuries				
Hospitalized	3%	6%	11%	8%
Fireworks Circumstances				
Injuries from Sparklers, Rocket, and Firecrackers	63%	64%	57%	52%
Injuries from Mishandling Firework	27%	23%	29%	30%
Errant Path or Malfunctioning Firework	21%	37%	41%	35%

Source: Indiana State Department of Health, Injury Prevention Program

Summary of Firework-related Injuries for 2007

For the 156 cases of fireworks-related injuries that comprise this report, 82 percent (126 cases) occurred during the 8-day period surrounding July 4, 2007, including 42 percent (65 cases) of injuries that took place on Independence Day. While those injured ranged in age from 2 months to 70 years, children and adolescents comprised almost half (48 percent) of reported cases. According to the 2005 U.S. Census population estimates for Indiana, persons under 18 years of age represent 26% of the population. Adults were present 61 percent (46 out of 75 cases) of the time for injuries reported in children and adolescents. Males were involved in 67 percent of all reported cases, which is a common finding for many traumatic injuries. The racial distribution of those injured was similar to that of the population of Indiana.

As expected, burns were the most frequent type of injury, involving 69 percent of all reported injuries. While the hands were the part of the body most commonly injured (33 percent), injuries to the eye (20 percent) were also frequent.

When it was reported, bystanders were injured in 21 percent (32 cases) of reported cases. Hospital admission was needed for 8 percent of those injured with 4 percent (6 cases) receiving specialized care for burn or eye injury. There were no deaths reported related to fireworks injuries during the time period of this report.

When the location of the activity using fireworks was identified, 83 percent (129 cases) of reported cases occurred at private homes, yards, or properties (self-owned, friend, neighbor, or relative). The type of fireworks involved in injuries varied somewhat by age. Sparklers were the leading cause of injuries in young children, rockets caused the most injuries in adolescents, and injuries in adults primarily involved aeriels, sparklers, and rockets.

Mishandling, malfunction, or errant path of fireworks was the most frequent mechanism reported for fireworks-associated injury, accounting for 61 percent of reported firework problems. Alcohol use was not stated for 84 percent of the reported cases. Of reported cases, 16 percent of those injured had consumed alcohol and 9 percent of the injured indicated that others at the scene were consuming alcohol.

APPENDIX

Age-Specific Fireworks-Related Injuries

This section of the report describes the characteristics of the reported injuries for three specific age groups: 1) children (birth -11 years of age), 2) adolescents (12-18 years of age), and 3) adults (19 years and older) (Table 3).

Children: Birth through Eleven Years of Age

Twenty-six percent (21 male and 20 female) injuries were reported in children. Sparklers (15 cases), rockets (7 cases), and firecrackers (5 cases) were the main types of fireworks that resulted in injury. Burns were the most common injury (77 percent) in this age group.

The most frequently reported injured area of the body was the hand/finger(s) (16 cases). Injuries to other body parts included eye (6 cases), leg (6 cases), foot (6 cases), trunk (5 cases), face/ears/head (4 cases), arm (3 cases), and neck (2 cases). Seventy percent (29 out of 41 cases) of injuries happened in the presence of an adult. Twelve of the injured children were bystanders. The majority (78 percent, 32/41) of those injured were evaluated in hospital emergency departments. Four cases (10 percent) were admitted or transferred to a hospital.

Adolescents: Twelve through Eighteen Years of Age

Among adolescents there were 34 fireworks-related injuries, involving 29 males and 5 females. The most frequent type of fireworks involved among this age group were rockets (10 cases), followed by firecrackers (10 cases), and aerial (3 cases). Two injuries were the result of homemade fireworks. Burns (25 cases) and contusions/lacerations/abrasions (13 cases) were the most frequent types of reported injuries.

The most common area of the body injured was the eye (14 cases). Injuries to other parts of the body included hand/finger(s) (11 cases), the face/ear/head (8 cases), leg (5 cases), arm (2 cases), neck (2 cases), and trunk (2 cases). Eighty-eight percent (30 cases) were seen in the emergency department with one case resulting in hospitalization.

Among adolescents, 17 injuries occurred while in the presence of an adult. Seven of the injured were bystanders. The most frequently reported mechanism of injury involved either malfunction (10 cases) of fireworks or mishandling (10 cases) of fireworks.

Adults: Nineteen Years of Age and Older

Among adults nineteen years of age and older, 81 people (52 percent of all cases) reported fireworks-related injuries during this reporting period (54 males and 27 females). The types of fireworks primarily involved in injuries were aerals (23 cases), sparklers (15 cases), rockets (11 cases) and firecrackers (8 cases). Forty-eight adults experienced burn injuries, and 33 experienced a contusion/abrasion/laceration-type injury.

Hand/finger injuries accounted for 37 reported cases. Injuries also included the eye (18 cases), legs (12 cases), face/ears/head (12 cases), trunk (9 cases), arm (9 cases), and foot (4 cases). Eight cases (10 percent) were admitted or transferred to the hospital.

The use of alcohol was reported by 30 percent (24 cases) of injured adults and 16 cases consumed alcohol within three hours of the injury. Thirteen of the injured cases were bystanders. Thirty-three cases reported an injury resulting from malfunctioning fireworks or an errant path of rockets, while 26 reported mishandling of fireworks which resulted in injury.

Table 3: Firework Injuries Specific to Age Groups, Indiana, 2006

	Ages 0 -11	Ages 12 – 18	Ages 19 +
Number	41 (26%)	34 (22%)	81 (52%)
Gender	41 total	34 total	81 total
Male	21 (51%)	29 (85%)	54 (67%)
Female	20 (49%)	5 (15%)	27 (33%)
Age range	2 mo. – 11 years (median – 6 years)	12 – 18 years (median – 14 years)	19 – 70 years (median – 33 years)
Race	41 total	34 total	81 total
White	33 (81%)	31 (91%)	72 (89%)
Black	3 (7%)	2 (6%)	5 (6%)
Other/Unknown	5 (12%)	1 (3%)	4 (5%)
Body Part Injured	49 total	44 total	101 total
Hand	16 (33%)	11 (25%)	37 (37%)
Arm	3 (6%)	2 (5%)	9 (9%)
Eye	6 (12%)	14 (32%)	18 (18%)
Face	4 (8%)	8 (18%)	12 (12%)
Leg	6 (12%)	5 (11%)	12 (12%)
Trunk	5 (10%)	2 (5%)	9 (9%)
Other	9 (6 foot, 2 neck, 1 ankle) (18%)	2 (neck) (5%)	4 (foot) (4%)
Injury Type	44 total	45 total	108 total
Burn	34 (77%)	25 (55%)	48 (44%)
Contusion	6 (14%)	13 (29%)	33 (31%)
Puncture	1 (2%)	0	8 (7%)
Penetrating	0	4 (9%)	7 (7%)
Sprain	1 (2%)	0	3 (3%)
Other	2 (5%)	3 (7%)	9 (8%)
Source of Care	41 total	34 total	81 total
ED (Emergency Department)	32 (78%)	30 (88%)	68 (84%)
Provider	9 (22%)	4 (12%)	13 (16%)
Evaluation Outcome	41 total	34 total	81 total
Home	37 (90%)	33 (97%)	73 (90%)
Hospitalized/ Transferred	1 hospitalized; 3 transferred (10%)	0 hospitalized; 1 transferred (3%)	3 hospitalized; 5 transferred (10%)
Locale of Injury Occurrence	41 total	34 total	81 total
Private (own or other)	22 own, 13 other (85%)	22 own, 9 other (91%)	48 own, 15 other (78%)
Public	1 (2%)	3 (9%)	12 (15%)
Other	1 (2%)	0	1 (1%)
Unknown	4 (10%)	0	5 (6%)
Eye Protection	6 total	14 total	18 total
None	6 (100%)	13 (93%)	16 (89%)

Glasses	0	1 (7%)	2 (11%)
Alcohol Consumption			
Alcohol	0	1	24
Alcohol in 3 hrs	0	1	16
Blood tested	0	0	1
Alcohol by others	1	2	11
Supervision			
Under 18	41	34	NA
Adult present	29	17	NA
No adult or unknown	12	17	NA
Other	41 total	34 total	81 total
Bystander	12 (29%)	7 (21%)	13 (16%)
Type of Firework	42 total	35 total	84 total
Firecracker	5 (12%)	10 (29%)	8 (10%)
Rocket	7 (17%)	10 (29%)	11 (13%)
Sparkler	15 (36%)	0	15 (18%)
Twister	0	1 (3%)	0
Lighting gunpowder	0	0	1 (1%)
Homemade	0	2 (6%)	1 (1%)
Aerial	3 (7%)	3 (9%)	23 (27%)
Other (fountain, roman candle, etc.)	8 (3 smoke bomb, 1 roman) (19%)	6 (2 roman, 1 blue hurricane, 1 tennis ball filled with gunpowder, 2 not specified) (17%)	16 (3 roman, 2 mortar, 1 bomb, 1 "hell Mary," 1 M80, 1 pole spinner, 7 not specified) (19%)
Pyrotechnics	0	0	0
Unknown	4 (10%)	3 (9%)	9 (11%)
Problem with Firework	43 total	34 total	88 total
Malfunction	4 (9%)	10 (29%)	24 (27%)
Errant path	5 (12%)	3 (9%)	9 (10%)
Debris	4 (9%)	2 (6%)	10 (11%)
Mishandling	11 (26%)	10 (29%)	26 (30%)
Other	8 (19%)	0	8 (9%)
Unknown	11 (26%)	9 (26%)	11 (13%)